

Sigmoid Flap: A Novel Technique for Perineal and Neovaginal Reconstruction after Abdominoperineal Resection with Near Total Vaginectomy for Locally Advanced Rectal Cancer

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BACKGROUND

En bloc tumor resection has been accepted as the most important element for cure of locally advanced rectal cancer.^{1,2} Perineal wound complications, such as pelvic abscess, wound dehiscence, and hernias are not uncommon because of the large dead space, the wound tension, and poor vascularity. Complications are greater in previously irradiated patients.³⁻⁵ Various immediate flap reconstruction techniques have been used,⁶⁻¹³ however, perineal wound complications and donor site complications have been reported.⁷⁻¹²

In female patients, reconstruction after surgical extirpation involving resection of the majority of vagina and the perineal body is challenging.¹⁰⁻¹³ The rectus abdominis myocutaneous flap is considered a suitable technique compared with thigh flap and pudendal flap because of the tissue bulkiness, reliability of pedicle, and large skin flap for neovaginal and perineal reconstruction.^{11,12} However, unfavorable outcomes have been reported, including vaginal dryness, excess secretion, and skin irritation caused by the keratinized skin flap.¹⁴

The colonic flap, which has been used for male-to-female gender reassignment surgery,^{15,16} however, has never been used for reconstruction after extirpation of locally advanced rectal cancer. Colonic mucosa is theoretically better for providing moisture for the neovagina and avoiding myocutaneous flap harvesting from the abdomen or legs. This study was designed to demonstrate this novel technique.

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STUDY DESIGN

This was a retrospective study of 3 patients who underwent extended abdominoperineal resection with near total vaginectomy and resection of perineal body en bloc for locally advanced rectal cancer at King Chulalongkorn Memorial Hospital between June 2007 and January 2009. The surgical plan was made based on physical examination and CT scan. Surgical extirpation involved abdominoperineal resection and resection the majority of posterior vagina and perineal body. Informed consent was obtained before the procedure.

SURGICAL TECHNIQUE

Extirpation of the tumor resulted in a large perineal defect with an intact narrow strip of the anterior vaginal wall (Fig. 1). A short segment of the sigmoid colon supplied by sigmoidal vessels was harvested using low ligation of the inferior mesenteric artery. Inferior mesenteric lymph node dissection was also performed. The proximal colon was brought to the left side of the abdomen for construction of an end colostomy (Fig. 2). The sigmoid flap was closed proximally, brought down to the perineal defect, and spatulated at the antimesenteric side of the distal part. Reconstruction of the neovagina was performed by suturing the sigmoid flap to the remaining anterior vaginal wall. Closure of the perineal wound to the neovagina was done (Fig. 3). A closed suctioned drain was placed.

RESULTS

Three patients underwent en bloc resection of locally advanced rectal cancer; 2 abdominoperineal resections with posterior pelvic exenteration and 1 abdominoperineal resection with posterior vaginectomy. Intraoperative complications were not encountered (see Table 1). Mean surgical time was 8.5 hours (range 7.5 to 10 hours) and mean blood loss was 600 mL (range 500 to 800 mL). Free surgical margins were achieved for all specimens. None of the patients had wound complications, but deep vein thrombosis developed in 1 patient and was successfully treated medi-

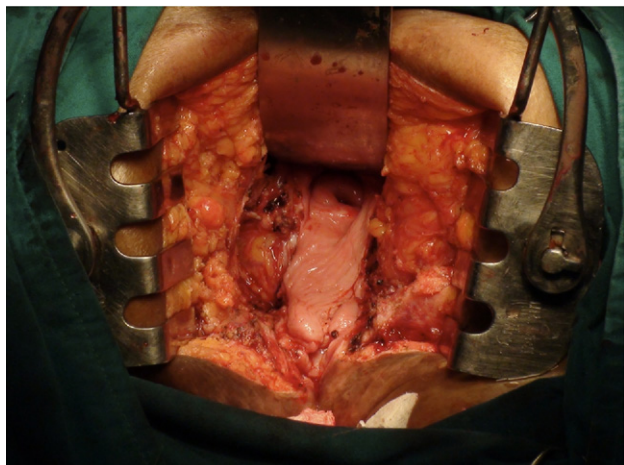


Figure 1. An intact narrow-strip of the anterior vaginal wall in a large perineal defect after extirpation of the tumor.

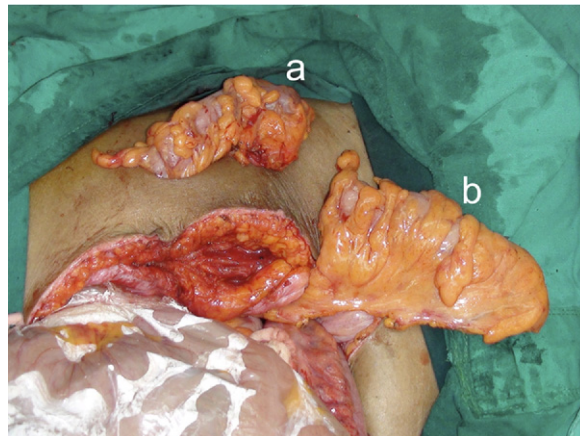
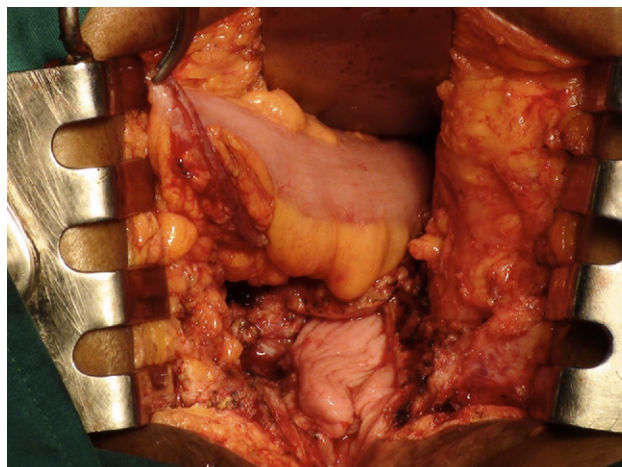
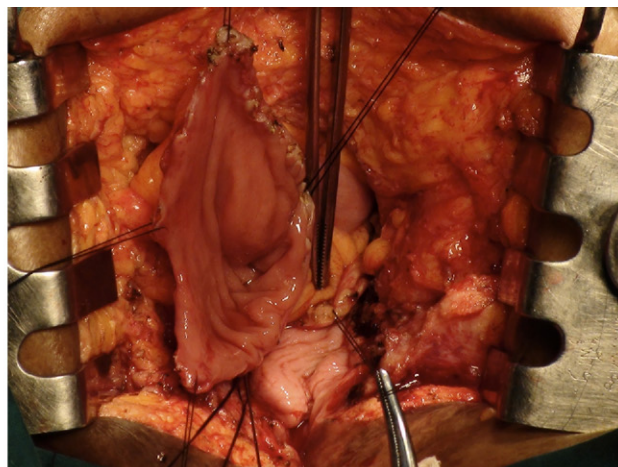


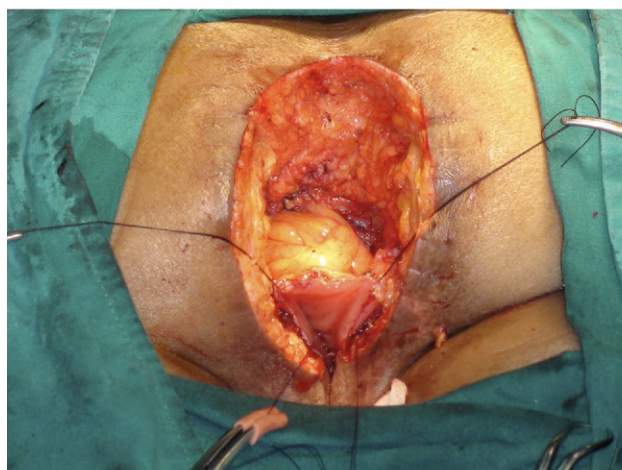
Figure 2. (a) Proximal colon was brought to the left side of the abdomen for the construction of an end colostomy. (b) Colonic flap, a short segment of the sigmoid colon, supplied by the sigmoidal vessels.



A



B



C



D

Figure 3. (A) Sigmoid flap was brought to the perineal defect. (B) The flap was spatulated. (C) Reconstruction of the neovagina. (D) Complete closure of the perineal wound.

Table 1. Results of the Case Series

Patient no.	Age, y	Operation	AJCC TNM Staging*	Operative time, h	Operative blood loss, mL	Blood transfusion, U	Postoperative complication	Hospital stay, d	Follow-up, mo	Status of disease
1	58	APR with wide excision of posterior vagina	T4 N2 M1 (groin node metastasis)	8	500	1	None	14	6	No local recurrence
2	75	APR with posterior pelvic exenteration	T4 N1 M0	7.5	800	2	DVT left leg	26	21	No local recurrence
3	30	APR with posterior pelvic exenteration, pelvic node dissection	T4 N1 M1 (obturator nodes and lung metastasis)	10	500	0	None	13	13	No local recurrence, but died of lung metastasis

*American Joint Committee on Cancer 6th edition Staging System.²²

APR, abdominoperineal resection; DVT, deep vein thrombosis.

cally. All of the patients have satisfactory results with good flap viability and have returned to daily activity without difficulty (Fig. 4). One patient reported active sexual activity with the neovagina. None of the patients reported vaginal dryness or excessive secretion. Local recurrence of the tumor was not found at follow-up, but 1 patient died of lung metastasis.

DISCUSSION

The benefit of primary reconstruction after extirpation of locally advanced rectal cancer using a vascularized flap has been reported.⁸⁻¹⁰ For female patients, however, en bloc resection of the tumor involving resection of the vagina results in a complicated perineal wound.^{10,11,13} Rectus abdominis myocutaneous flap has become a technique of choice, especially in perineal and neovaginal reconstruction because of a lower incidence of flap-specific complications and flap loss compared with the gracilis myocutaneous flap and the Singapore flap.¹¹⁻¹³ However, harvesting the tissue from the abdomen can be complicated by stoma creation and the chance of an abdominal wall hernia.⁹⁻¹² Although the myocutaneous flap provides good tissue healing, the skin appendages and keratin secretion can cause patient discomfort and an unpleasant odor.¹⁴



Figure 4. Complete healing of the perineal wound. The flap mucosa is viable.

Use of the sigmoid colon for reconstruction of neovagina has been reported for male-to-female gender reassignment surgery and vaginal replacement surgery in vaginal agenesis.¹⁵⁻¹⁸ Advantages of using the sigmoid flap are the similar length, texture, and appearance to the vagina. In addition, natural lubrication of the neovagina can only be provided by this method.¹⁶ However, this technique has never been used for reconstruction after extirpation of locally advanced rectal cancer involving near total vaginectomy with resection of the perineal body. The sigmoid flap is adequate for emptying the pelvic dead space, therefore, septic complications and pelvic hernias can be prevented. In addition, moisture for the neovagina can be provided by the colonic mucosa.

The drawback of using the colon for the neovaginal reconstruction is excessive discharge caused by diversion colitis.¹⁹ However, patient satisfaction has been good, including the functional neovagina for sexual intimacy, without excessive mucous production or the need for routine dilation.^{17,18}

The sigmoid flap is invariably supplied by sigmoidal vessels, which are not difficult to construct. The technique of low ligation of the inferior mesenteric artery with inferior mesenteric lymph node dissection was used in this study to preserve the sigmoidal vessels. Although there is a chance of remaining lymphatic tissue left in the low ligation technique, there are no differences reported in the oncologic outcomes comparing high ligation and low ligation of the inferior mesenteric artery.^{20,21}

Perineal and neovaginal reconstruction using colonic flap is technically feasible and provides good outcomes. Additional use of the procedure, particularly in patients desiring a functional vagina, is warranted.

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